

Remarks

Claims 25, 28-38, 40-48 and 68-76 are now pending in this Application. Claims 1-24, 39 and 49-67 were previously canceled without prejudice. With this paper, Claims 26 and 27 have been canceled without prejudice and new Claims 68-76 have been added. Applicants have amended independent Claims 25 and 33 and Claims 44-48-to further define Applicants' invention. Claims No new matter has been introduced with the amendments. The amendments find support in the as-filed specification, including para. [0025], [0027]-[0029] and [0032] and Figures 1 and 2. Applicants respectfully request entry of the amended claims.

In the Office Action made final and mailed on May 29, 2009, the Examiner maintained a rejection of the pending claims under 35 U.S.C. § 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. § 103(a), as being unpatentable over JP 11-010631 (hereinafter, "Yamada"). The Examiner stated,

"Yamada discloses composite building material made up of cement mixed with pulp of cellulose fiber. The mixture composition is made of 200 g of Portland cement and 20 g of pulp added to water. The pulp is thus 11% of the mixture of pulp and cement. The Yamada pulp cement mixture Chemical Oxygen Demand (COD) is 5 ppm (0.000,005) or less, which is lower than the claimed COD of less than 4.5 kg/ton which calculates to 0.00225 (Abstract pg. 2, while document pgs. 3-7)."

Applicants agree with the Examiner that Yamada does generally disclose that wastewater eluted from a cement-pulp combination that is mixed for only 5 minutes may show a COD of 5 ppm. However, such a teaching is contrary to the teachings of a known standard for measuring the COD content of pulp as discussed more fully below. Importantly, Yamada never teaches or describes the actual COD content of the cellulose fibers alone. Yamada is only, by admission, teaching the elution of soluble organic components that may elute from pulp (see, para. [0003]) and it is only the components that elute after a 5-minute mixing that are measured, which for a 5-minutes mixing would translate to a speed of about 3-15 rpm for a standard cement mixer as is known to one of ordinary skill in the art. Thus, it is incorrect to state that Yamada is capable of providing any true understanding or measurement of the COD content of fibers themselves

because of the following factors that will be described further and include: (1) COD is trapped in cellulose fibers; (2) known standards for measuring COD were available at the time of filing that show that COD from fibers can only be measured after fibers alone and in a liquid are rigorously processed to extract the COD; (3) Yamada teaches only how to measure COD eluted from cement wastewater (whitewater) and not from fibers alone, which does not accurately measure the COD of the fibers.

Applicants have also reviewed *In re Thorpe* (227 USPQ 964 (Fed. Cir. 1985) as well as a recent *en banc* decision by the Federal Circuit [*Abbott Laboratories v. Sandoz, Inc.*, No. 2007-1400, (Fed. Cir. May 18, 2009)] and submit that both rulings assert that product by process claims may be limited and defined by the process. In both decisions, the courts ruled that process limitations are important for patentability analysis and will affect the scope of the claim. Further, in *In re Thorpe*, claims were rejected because it had been affirmed that the USPTO had presented a *prima facie* case that Thorpe was then not able to overcome. The *prima facie* case presented by the USPTO was that the product of the prior art and the product of Thorpe's process were the same based on similar reactants, reaction conditions and properties. Applicants respectfully submit that, unlike *In re Thorpe*, the prior art, including Yamada, does not teach or describe the claimed fiber cement building product or the claimed formulation. Thus, the Examiner has not met the burden of presenting a *prima facie* case of unpatentability.

Applicants respectfully submit that for the reasons presented above and described further below, the outstanding rejections should be reconsidered and removed.

1. COD is trapped in cellulose fibers

One of ordinary skill in the relevant art understands and knows quite well that COD is released from harmful compounds and impurities that are trapped inside pores and cavities of cellulose fiber pulp during the pulping process. Applicants very own specification describes this general understanding, see, e.g., para. [0004]. Applicants specification also describes that the

trapped compounds and impurities are measurable as chemical oxygen demand (COD). The Examiner appears to be in agreement with these facts. The impurities that lead to COD are still present in cellulose fibers after conventional pulp washing processes, see, e.g., para. [0006], Table 1 of the as-filed application. Applicants' specification further discloses a patentably distinct washing process (see, e.g., para. [0025]-[0030]) and FIG. 1) along with a method of measuring COD from impurities that are trapped in cellulose fibers themselves, see, e.g., para. [0025]-[0030], [0031]-[0032] and FIG. 1. Yamada does not teach or suggest a further washing process to release trapped impurities from pulp and Yamada does not teach or suggest a method of measuring COD from impurities that are trapped in cellulose fibers themselves. One of ordinary skill in the art would not be able to determine the COD content of the pulp itself from the teachings of the Yamada reference, either alone or in combination with other references. In fact, one of ordinary skill in the art would likely believe that conventional pulp was used by Yamada, particularly because of statements made by the Yamada reference itself, including the stated problem in which COD from cement wastewater was at least 250 ppm (see para. [0003] of Yamada). This is directly contrary to the teachings of the present invention, including the claims presently pending.

2. Known standards for measuring COD were available at the time of filing that show that COD from fibers can only be measured after fibers alone and in a liquid are rigorously processed to extract impurities in order to measure COD

Applicants specification directly teaches that the COD content of cellulose fibers can only be made after fibers alone are diluted in a liquid and dispersed rigorously to release trapped impurities, see para. [0032]. To release the impurities the fibers diluted in a clear liquid are dispersed for 10 minutes at about 3200 rpm, which is 32000 revolutions. The COD is then measured after the fibers are filtered from the clear liquid using a dichromate reaction and a colorimetric reader. This methodology is similar to a known industry method for measuring COD content in pulp available at the time of filing the Application for patent and used by the pulp and paper industries, known as SCAN-CM 45:91 (see Exhibit A). The SCAN-CM 45:91

method is prepared by the recognized Nordic Standardization Programme, previously known as the Scandinavian Pulp, Paper and Board. Like Applicants specification, SCAN-CM 45:91 also dilutes fibers in a clear liquid and disintegrates the fiber solution for five minutes using a disintegrator (see section 7, pg. 2). One skilled in the art understands that laboratory pulp disintegrators generally run at about 3000 rpm, which will provide 15000 revolutions after 5 minutes. After disintegration, the SCAN-CM 45:91 also removes the fibers from the clear liquid (see section 8, pgs. 2-3). SCAN-CM 45:91 and then measures COD in the clear liquid using a dichromate reaction and a colorimetric reader (see section 9, pg. 3). Thus, SCAN-CM 45:91, like Applicants own specification teaches that COD is measured only from fibers and only after fibers alone are in a clear liquid solution and then rigorously treated to extract the impurities trapped in the fibers. This differs significantly from Yamada, which does not teach or suggest that COD is measured only from fibers and only after fibers alone are in a clear liquid solution and then rigorously treated to extract the impurities trapped in the fibers. Instead, Yamada expressly teaches how to measure COD eluted from cement wastewater or whitewater, in direct contradiction to the subject application and invention as taught and claimed; Yamada expressly teaches measuring only after a five minute mixing, which will account for only about 15-65 revolutions. Yamada does not teach that fibers are separated from the cement or that the fibers alone are rigorously processed to extract the impurities trapped in the fibers, which is contrary to the present invention. This is further discussed below. Applicants refer the Examiner to a confirmatory statement made by an independent expert in fiber cement, Dr. Edmone Roffael, submitted on February 24, 2009, under a 37 C.F.R. 1.132 declaration. In the expert testimony, it was confirmed by Dr. Roffael that the extraction from a cement mixture disclosed by Yamada cannot be compared to "an extraction method conventionally used for measuring COD of lignocelluloses fibers" and Dr. Roffael concluded that "it is not true at all that a cement mixture having a COD of 5 ppm may be used to identify a COD value for cellulose fibers" (see section 6 of declaration). Furthermore, Dr. Roffael expressly stated that, as an expert, he did not believe that Yamada either anticipates or is obvious over the claimed invention (see section 7 of the declaration).

3. Yamada teaches only how to measure COD eluted from cement wastewater (whitewater) and not from fibers alone

Yamada expressly states that the problem to be solved by the reference is to reduce the COD content in cement wastewater, which is continually reused and into which some COD elutes (para. [0003] and Fig. 1). Thus, Yamada verifies that COD only gradually accumulates in a cement mixture and that the reference is only able to measure COD that gradually elutes from pulp, which is contrary to the teachings of the subject Application where COD of cellulose fibers alone are accurately and properly measured. Yamada then continues to teach a method of mixing fresh water with used cement wastewater at a ratio of 4:1 (para. [0009], [0013]) in order to be able to dilute or reduce the accumulation of COD in the wastewater, which was said to be 250 ppm, Any measurement of COD made by Yamada is made after only a five minute mixing of pulp with cement, which is not in accordance with the industry standard of measuring COD from fibers, which will include ensuring fibers are alone and COD is measured after a rigorous dispersion or disintigration of at least 15000 revolutions (see Exhibit A). Yamada expressly shows in Fig. 1 that even when cement wastewater is diluted (at a ratio of 4 parts fresh water to 1 part wastewater) when using a pulp that elutes a wastewater COD of 5 ppm (broken line), the accumulation of COD in the recycled water is between 100 and 150 ppm (solid line). Nothing within the Yamada reference teaches or suggests what the actual COD content extracted from pulp or cellulose fibers is.

The Examiner appears to be assuming that the pulp of Yamada does not trap impurities and will release the impurities after only a 5 minute mixing, which Applicants have shown is an incorrect assumption. An analogous example is looking at how hemoglobin is measured. One understands that hemoglobin cannot be measured by simply measuring directly from a sample of blood. Hemoglobin is a protein found in red blood cells, which is in blood. To measure hemoglobin, red blood cells must themselves first be broken down to release hemoglobin. The hemoglobin is released into solution and it is only after the red blood cells are broken down that released (free) hemoglobin can be measured, which is generally by exposure to a chemical

containing cyanide and then measuring the solution colorimetrically. The release of hemoglobin from red blood cells is akin to releasing impurities from cellulose fibers. The measurement of hemoglobin using cyanide is akin to measuring COD via a dichromate reaction. Just as one of ordinary skill in the art knows that hemoglobin cannot be measured directly from blood, one of ordinary skill in the art knows that COD content of cellulose fibers cannot be measured directly from whitewater eluted from a cement-pulp mixture.

Applicants respectfully submit that they have shown that Yamada does not teach or suggest the claimed invention and that one cannot simply or routinely modify Yamada to arrive at Applicants' claimed invention. In fact, Yamada's teachings have been shown to be contrary to the invention as claimed.

Applicants respectfully submit that the invention as currently claimed is patentable and is distinct from Yamada and other cited documents. Applicants respectfully submit that no *prima facie* case has been presented by the Examiner to maintain the rejection under 35 U.S.C. § 102(b) or, in the alternative, under 35 U.S.C. § 103(a). Applicants have submitted timely evidence traversing the rejection with a preponderance of objective evidence of lack of anticipation and nonobviousness. Accordingly, Applicants respectfully request the rejections be withdrawn.

Conclusion

Applicants respectfully submit that the Application is in condition for allowance, and pursuant to the filing of this paper and accompanying documents, Applicants earnestly seek allowance of currently pending Claims 25, 28-38, 40-48 and 68-76 as provided in the Listing of Claims beginning on page 3 of this paper.

Should the Examiner have questions, comments, or suggestions in furtherance of the prosecution of this Application, please contact Applicants' representative at 214.999.4330. Applicants, through their representative, stand ready to conduct a telephone or in-person interview with the Examiner to review this Application if the Examiner believes that such an interview would assist in the advancement of this Application.

This paper is submitted concurrently with a Request for Continued Examination and the appropriate fees. Fees for the proper extension of time are also submitted. In the event that any additional time is needed for this filing, or any additional time in excess of that requested, please consider this a petition for an extension of time for any needed extension of time pursuant to 37 C.F.R. § 1.136 or any other section or provision of Title 37. Applicants respectfully request that the Commissioner grant any such petition and authorize the Commissioner to charge Deposit Account No. 07-0153 of Gardere Wynne Sewell LLP and to reference Attorney Docket No. 129843-1022. Please credit any overpayments to this same Deposit Account.

This is intended to be a complete response to an Office Action mailed May 29, 2009.

**Please direct all correspondence to the practitioner listed below at Customer No.
60148.**

Respectfully submitted,

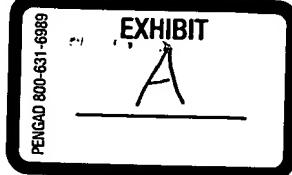
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SCANDINAVIAN PULP, PAPER AND BOARD
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Kraft Pulps

Water-soluble organic matter

1 Scope and field of application

This SCAN-test Standard describes the procedure for determining water-soluble organic matter retained in wet kraft pulp. The Standard is intended for the estimation of the efficiency of a washing operation and for the measurement of the amount of water-soluble organic matter carried to a subsequent section of the mill or to the environment. It is designed primarily for wet unbleached pulps produced by the sulphate process. The water-soluble organic matter is expressed in units of chemical oxygen demand (COD).

The Standard is applicable to pulps with a content of water-soluble organic matter in the range 4 to 60 kg COD per tonne.

Recommendations for sampling are not covered by the Standard. In certain cases the recommendations given in SCAN-C 30 are applicable.

Note — The procedure prescribed for the COD determination may be replaced by the one described in ISO 6060 or in any equivalent national standard.

2 Principle

To a sample of wet pulp, sodium hydroxide solution, 0.001 mol/l, is added to yield a pulp concentration of

about 20 g/l. The slurry is disintegrated and 500 ml of the suspension are filtrated through a paper filter on a Büchner funnel. The pulp mat is washed on the filter with sodium hydroxide solution. The chemical oxygen demand (COD value) of the filtrate is determined. The result is expressed in kilograms of COD per tonne of dry, washed pulp.

3 Definitions

3.1 *Water-soluble organic matter in pulp*. The amount of organic matter, expressed in units of chemical oxygen demand, that can be removed from a pulp sample by a standardized washing procedure.

3.2 *Chemical oxygen demand (COD)*. The mass concentration of oxygen equivalent to the amount of dichromate oxidant consumed by dissolved and suspended matter when a water sample is treated with that oxidant under defined conditions. (This is the definition given in ISO 6060).

4 References

SCAN-C 18 — Disintegration of chemical pulp for testing.
SCAN-C 30 — Sodium content of wet pulp.
ISO 6060 Water quality—Determination of the chemical oxygen demand.

5 Apparatus

5.1 *Wet disintegrator*, as described in SCAN-C 18.

5.2 *Digestion tubes* of borosilicate glass, with screw caps lined with PTFE (polytetrafluoroethylene) and with a capacity of at least 10 ml.

5.3 *Heating block* with holes dimensioned for a close fit of the tubes and a block heater to operate at $150 \pm 2^\circ\text{C}$.

5.4 *Precision burette* capacity 5 ml, with a reading accuracy of 0,01 ml.

5.5 *Magnetic stirrer* with plastic-coated magnets.

6 Reagents and chemicals

6.1 *Distilled water* or water of equivalent purity. Check the quality of the water by running blanks (described in Section 9) and similar parallel tests without any boiling, but otherwise exactly as stated. Note the consumption of ammonium iron (II) sulfate solution (6.7) in both cases. A difference of more than 0,5 ml indicates poor water quality. For the determination of COD values below 100 mg/l the difference shall not exceed 0,2 ml.

The quality of distilled water can often be improved by redistilling it from an acidified solution of potassium dichromate or potassium permanganate, using all-glass distillation equipment.

6.2 Sodium hydroxide solution, 0,001 mol/l.

6.3 *Sulphuric acid*, 4 mol/l. Add, to about 500 ml of distilled water, 220 ml of sulphuric acid, H_2SO_4 , density 1,84 g/ml, in portions and with caution. Allow to cool and dilute to 1 litre.

6.4 *Potassium dichromate*, 0,0400 mol/l. Dissolve 11,768 g of potassium dichromate, $\text{K}_2\text{Cr}_2\text{O}_7$, dried at 105°C for 2 h, in distilled water and dilute to 1000 ml.

6.5 *Silver sulphate-sulphuric acid*. Add 10 g of silver sulphate, Ag_2SO_4 , to 1 litre of sulphuric acid, H_2SO_4 , density 1,84 g/ml, preferably directly into the reagent bottle. Allow 1 or 2 days for dissolution. The dissolution rate is enhanced by stirring.

6.6 *Mercury (II) sulphate solution*. Carefully add 50 ± 2 ml sulphuric acid, density 1,84 g/ml, to 450 ml of distilled water (6.1) and mix. Dissolve 100 ± 1 g mercury sulphate, HgSO_4 , in the sulphuric acid.

6.7 *Ammonium iron (II) sulphate* standard volumetric solution, 0,07 mol/l. Dissolve 27,5 g ammonium iron (II) sulphate hexahydrate, $(\text{NH}_4)_2\text{Fe}(\text{SO}_4)_2 \cdot 6\text{H}_2\text{O}$, in distilled water. Add with caution 20 ml sulphuric acid, density 1,84 g/ml. Cool and dilute with water to 1000 ml.

Determine the concentration of the solution as follows: Dilute $1,00 \pm 0,01$ ml dichromate solution (6.4) with 2 ml of distilled water, add 3 ml of sulphuric acid (6.3) and 2 to 3 drops of indicator (6.8) and titrate with the ammonium iron (II) solution.

Calculate the concentration c expressed in moles per litre as follows:

$$c = \frac{6 \cdot 0,0400}{V}$$

where V is the volume in millilitres of ammonium iron (II) solution consumed in the titration.

6.8 *Ferroin indicator*. Dissolve 0,7 g of iron (II) sulphate heptahydrate ($\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$) in distilled water. Add 1,50 g of 1,10-phenanthroline monohydrate ($\text{C}_{12}\text{H}_8\text{N}_2 \cdot \text{H}_2\text{O}$) and shake the flask until the reagent is dissolved.

6.9 *Potassium hydrogen phthalate* standard reference solution, 2,082 mmol/l. Dissolve 0,4251 g potassium hydrogen phthalate, $\text{KC}_8\text{H}_5\text{O}_4$, dried at 105°C for 1 h, in water and dilute to 1000 ml.

The solution has a theoretical COD value of 500 mg/l.

Warning — Care must be taken when preparing and handling solutions containing silver sulphate or mercuric sulphate as these substances are toxic.

Note — Used reagents contain mercury, silver and chromium salts. Mercury salts discharged into receiving streams may be converted into toxic methyl mercury compounds by bacterial action. Used reagents must be handled or treated before disposal in accordance with national or local regulations.

7 Sampling and preparation of sample

Recommended sampling techniques, including sample sizes and sampling frequencies for use in mills with various pulp washing systems, are described in the Appendix to SCAN-C 30. Other techniques may also be used.

The amount of sample received in the laboratory is often so large that a smaller test sample must be withdrawn. Before doing so, dilute the sample with 0,001 mol/l sodium hydroxide solution (6.2) to a pulp concentration of about 20 g/l, preferably in a plastic bucket. Transfer a portion of about 2 litres to the disintegrator (5.1).

Disintegrate the diluted sample for five minutes in the disintegrator. While mixing, take a test sample quickly and in one stroke using a scoop with a capacity of about half a litre. Transfer the test sample to a glass beaker.

Note — It is important that the pulp sample is washed and treated as described above and as described in the next Section immediately after sampling. A delay for more than two hours may lead to a higher result, presumably because of leaching of organic matter from the pulp fibres.

8 Washing the pulp sample

Place a paper filter of known oven-dry weight in a Büchner funnel. Filter the test sample and collect the filtrate in a filter flask. Remove as much water from the pulp as possible by suction and by pressing with a thick glass rod having a flattened end.

Wash the pulp mat left on the filter in the funnel three times with 100 ml of 0,001 mol/l sodium hydroxide solution (6.2), pressing the pulp each time with the glass rod.

Remove the pressed pulp and the paper filter from the funnel and dry them overnight in an oven at 105°C . Place them in a desiccator and allow them to attain room temperature. Weigh, subtract the weight of the filter paper and note the amount of oven-dry pulp m to the nearest 0,01 g.

Transfer the filtrate, combined with the washings, to a 1 litre measuring cylinder. Note the volume as b litres. Check that the filtrate is free from fibres and other visible particles.

9 Determination of the COD value

Prepare a set of digestion tubes (5.2) by measuring into each tube 1,00 ml of dichromate solution (6.4), 3 ml of silver sulphate-sulphuric acid solution (6.5) and 0,2 ml of mercury sulphate solution (6.6).

A supply of tubes adequate for one week can be prepared beforehand. Store the tubes at 4°C.

Measure 2,00 ml, V_0 , of the filtrate into a prepared reaction tube. Ensure that sample and reagents are well mixed and place the tube in the preheated reaction block (5.3). Digest for 2 h; boiling should begin within 5 to 10 min. If the solution turns green, repeat the determination with a more dilute test sample.

Allow to cool and titrate excess dichromate with ammonium iron (II) solution (6.7) using 1 to 2 drops of ferroin (6.8) as indicator. Take as the end-point the first sharp colour change from blue-green to reddish brown, even if the blue-green colour reappears after a few minutes.

Carry out a blank test in parallel by the same procedure, but replace the sample filtrate by 2,00 ml of distilled water (6.1).

Carry also out a check test on 2,00 ml of the potassium hydrogen phthalate standard solution (6.9) by the same procedure as for the sample. The theoretical oxygen demand of this solution is 500 mg/l; the experimental procedure is satisfactory if the result of the check test is at least 96% of this value.

Note — Some closed tube procedures use a photometric finish for the determination of the reduced part of the dichromate. Such procedures may be used for the determination of the COD value of the filtrate provided that

- (a) the reaction conditions (temperature, concentration of sulphuric acid, potassium dichromate etc) are the same as those prescribed in the Standard procedure.
- (b) the correlation between the results from the photometric procedure and those obtained by the Standard procedure has been established experimentally on samples (filtrates) of the same type as those to be analysed.
- (c) the report includes a statement that a photometric procedure has been used for the determination of the COD value together with a reference to that procedure.

10 Calculation

Calculate the COD value of the filtrate from the expression

$$X = 8000 c(V_1 - V_2)/V_0$$

where

X is the COD value of the filtrate, in milligrams per litre;

c is the concentration, in moles per litre, of the ammonium iron (II) sulphate solution (6.7);

V_1 is the volume, in millilitres, of the ammonium iron (II) sulphate solution (6.7), used in the titration of the blank;

V_2 is the volume, in millilitres, of the ammonium iron (II) sulphate solution used in the titration of the filtrate;

V_0 is the volume, in millilitres, of the filtrate taken.

Calculate the content of water-soluble organic matter in the pulp from the expression

$$Y = X \cdot b/m$$

where

Y is the COD content, in kilograms per tonne;

b is the total volume of the filtrate, in litres;

m is the oven-dry weight of the pulp, in grams.

11 Report

The test report shall include a reference to this SCAN-test Standard and the following particulars

- (a) date and place of testing;
- (b) precise identification of the sample;
- (c) the result, in kilograms per tonne;
- (d) any departure from the procedure described in this Standard or any other circumstances which may have affected the test results.

12 Precision

The reproducibility of the determination depends in the first place on the sampling. The repeatability was tested on unbleached sulphate pulps. At the level of 45 kg/t it was 2,8% and at the lower limit of the test, 4 kg/t, it was 10,7%, expressed as the relative standard deviation.

SCAN-test Standards are issued and recommended by the central laboratories of the pulp, paper and board industries in Denmark, Finland, Norway and Sweden. Distribution: Secretariat, Scandinavian Pulp, Paper and Board Testing Committee, Box 5604, S-114 86 Stockholm, Sweden.